Light-weight Self-correcting Inflatable/rigidizable Space Antennas, Phase I

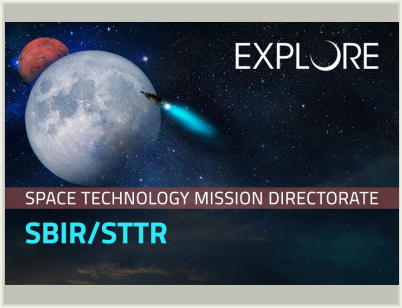
Completed Technology Project (2007 - 2007)

Project Introduction

The NASA/L'Garde Inflatable Antenna Experiment (IAE)flown in STS-77 has showed the potential of this class of structures in significantly reducing the costs for space access. It also pointed the way to future work. Numerous studies and ground tests on real hardware conducted by L'Garde since then, have shown the extension of these advantages to rigidizable parabolic reflectors and provided further proof for their manufacturability, their significant stowage volume advantages. and their controlled deployment. The most significant issue that remains is their surface accuracy under the influence of, mainly, thermal loads. The structural films laminates that must be used in their construction exhibit positive thermal expansion coefficients adversely affecting their accuracy in the frequency range >1-3 GHz. In Phase 1 of this effort L'Garde and SARA intend to design and analyze a corrective system for inflatable and/or rigidizable antennas comprised of a phased array feed capable of correcting phase errors and a movable feed platform to correct for focal point shifts. If the corrective system feasibility is proven and we proceed to Phase 2, such a system will be designed, built and tested on a subscale inflatable or rigidizable reflector. This system can have profound positive effects on space communications.

Anticipated Benefits

Potential NASA Commercial Applications: Self-correcting rigidizable appertures can find many terrestrial uses in Terrestrial antennas required in high gain, or high data throughput (as in video) applications, when ease and cost of transporting large apertures is of prime importance, such as during natural or man-made disasters, or a combat theater, where reducing the logistic footprint is of prime importance to armed forces. These types of applications could be much more efficiently accomplished with a rigidizable aperture that inflates to shape in a short time then rigidizes. The rigidization material will be thicker in these applications so that the appertures can sustain themselves with the much more severe loads present in the terrestrial environment (gravity, wind, thermal,e tc.) than those encountered in space.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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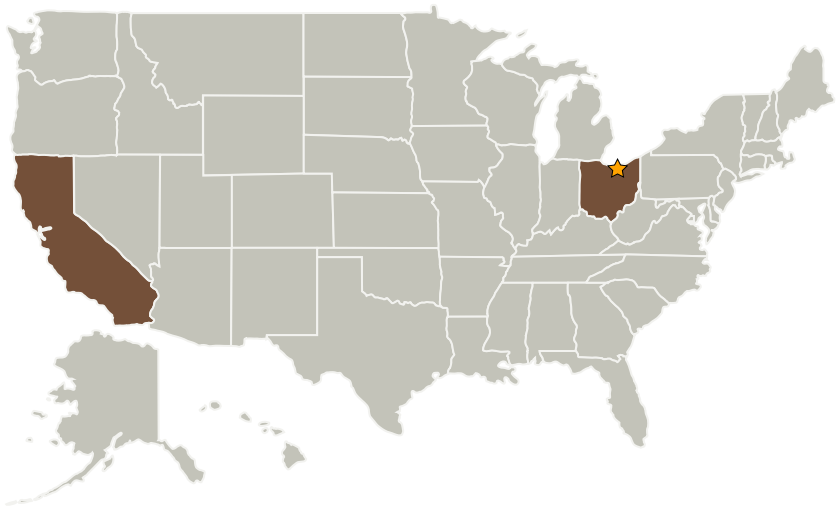
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
L'Garde, Inc.	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Tustin, California

Primary U.S. Work Locations	
California	Ohio

Project Transitions

January 2007: Project Start

July 2007: Closed out

Closeout Summary: Light-weight Self-correcting Inflatable/rigidizable Space A ntennas, Phase I Project Image

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Project Manager:
Felix A Miranda

Principal Investigator:
Arthur Palisoc

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.2 Radio Frequency
    - TX05.2.6 Innovative Antennas